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1144637

PATENT SPECIFICATION

NO DRAWINGS

1144637

Inventor: SEAN GEOFFREY HALL

Date of filing Complete Specification: 20 July, 1967.

Application Date: 27 July, 1966. No. 33712/66.

Complete Specification Published: 5 March, 1969.

Index at acceptance:—A5 E(1A1A, 1A6, 1A11)

Int. Cl.:—A 61 l 13/00

COMPLETE SPECIFICATION

Iodophor Dairy Sanitising Agents

We, KILCO CHEMICALS LIMITED, of 374, Shankill Road, Belfast 13, Northern Ireland, a Company registered under the laws of Great Britain, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to indophor dairy sanitising agents and particularly iodophor udder sanitising agents. An iodophor is a complex of iodine with a non-ionic surface-active agent which makes iodine available for sanitising purposes when in contact with water.

Iodophor preparations in which a part or all of the elementary iodine content is complexed with non-ionic surfactants are commonly used as sanitising agents in the dairy industry. They are used particularly to dip cow udders in, after milking, to inhibit mastitis.

Continual use of Iodophor disinfectants has resulted in a widespread incidence of teat cracking. Cracks or fissures in the dermal tissue of the cow's teat act as residence points for bacterial colonies and it is difficult to penetrate these points with any type of waterborne disinfectant. It is assumed that the dermatological changes resulting in cracking are due to denuding of the skin's natural protective fats by a process of emulsification.

Whilst iodophor preparations have high bactericidal activity, many of them suffer from the disadvantage that high percentages of ethoxylated surfactants are required for mull solubilization of their elementary iodine content; it is recognised that only about 20% of the added iodine is chemically combined with the surfactant, the remainder being titratable analytically with standard sodium thiosulphate solutions. A high content of non-ionic surfactant in a conventional iodophor preparation however has strong degreasing properties on the skin. Free elementary iodine also is harsh on the skin.

The cheapest and most widely available non-ionic surfactants are alkoxylated compounds having a free terminal hydroxyl group on the alkoxy chain. However it has already been stated in literature that these surfactants are unsatisfactory for iodophor formulations due to shelf life instability which is presumed to be caused by interaction between iodine and ther terminal hydroxyl groups.

One previous proposal for overcoming the solubility factor was described in British Patent Specification No. 825,676 which suggested employing an alkali halide, e.g. sodium iodide, in the formulation. It is assumed that this results in production of the I_3^- ion.

It is an objpect of the present invention to provide an iodophor dairy sanitising agent which reduces the problem of teat cracking, which can obtain relatively high percentages of iodine and surfactant, and which has good shelf stability even when a non-ionic surfactant having non-aromatic terminal —OH groups is used.

The present invention provides an iodophor udder sanitising agent in which the iodophor consists at least in part of a complex of iodine with a water soluble alkoxylated lanolin.

Preferably the alkoxylated lanolin is ethoxylated lanolin which may also be described as the polyethylene oxide derivative of lanolin. However any other suitable water soluble polyalkylene oxide derivative of lanolin may be used, particularly those having alkyl groups containing 2—8 carbon atoms.

The invention also provides a method of preparing an iodophor udder sanitising agent which comprises forming a complex of iodine with a water soluble alkoxylated lanolin.

A non-ionic surfactant other than the alkoxylated lanolin may also be present, complexed with iodine in the iodophor. In this case, the alkoxylated lanolin should be mixed with the other non-ionic surfactant before iodine is added. Poor stability may result if the lanolin derivative is added after iodine has

SEE ERRATA SLIP ATTACHED

combined with the other non-ionic surfactant.

The invention further provides a method of disinfecting cows' udders which comprises treating the udders with an iodophor udder sanitising agent as defined above.

It is believed that the alkoxylated lanolin is absorbed into the udder dermal tissues, producing an emollient action which succeeds in suppressing teat cracking. The lanolin derivative conditions the skin of animals by replacing the natural oil which may be removed by the non-ionic surfactant (if present)

The sanitising agent may also contain a small percentage of an organic acid such as citric acid, propionic acid, tartaric acid or maelic acid. The organic acid keeps the pH value on the slightly acid side which is normal for teat tissue where the natural acidity is due to amine acids produced by normal protein degradation.

The alkoxylated lanolin may make up from 15 to 100% by weight of the total surfactant. When another non-ionic surfactant is present, it may be a surfactant with or without terminal —OH groups. Preferred surfactants having terminal —OH groups are ethoxylated nonly phenol and ethoxylated octyl phenol (or nonyl phenol polyethylene glycol ether and octyl phenol polyethylene glycol ether). An example of a surfactant having no terminal —OH groups is that sold under the Trade Mark Texofor ISU by Glovers Chemicals Limited and understood to be a polyexyethylene ether ester of fatty acids.

Prior art iodophors based on octyl and nonyl phenols generally have poor storage stability.

Their terminal non aromatic —OH groups are eventually reactive with the elementary iodine of the iodophor with the result that thiosulphate titrations of the product over a storage period reveal that the active sanitising iodine concentration falls off and can produce iodated products which in certain cases can actually be skin irritants. In this work it has been shown that iodine does react with non-ionic surfactants such as ethoxylated nonyl and octyl phenols and that iodine losses, in the titratable sense, can be as high as 7% if the product is stored over three months under normal daylight conditions. Iodophors containing octyl and nonyl phenols or any other nonionic surfactant having a terminal OH group in the alkoxylated chain seem to behave similarly. It has been found, however, that mixtures of such non ionic surfactants together with alkoxylated lanolin have good storage life; e.g. titrations using thiosulphate carried out before and after 124 days storage at room temperature and in the presence of daylight, have only differed by as little as 0.1 mls. N/10 sodium thiosulphate and this is well within the limit of error in any experimental titration. Whilst it is no part of this specification to elucidate the physio-chemical reactions elading to this stable state it is suggested that the stability of our product as herein described could be attributed to some form of hydrogen bonding between the alkoxylated lanolin and the non-ionic surfactant used.

Iodophor sanitising agents normally can have iodine concentrations within the range 0.25 to 2.5% by weight. In the product of the invention the presence of the lanolin derivative diminishes the dermatological harshness of the elemental iodine and therefore high concentrations of iodine in the range 1.5 to 2.5% by weight can be used. In tests carried out at a concentration of 2% iodine it is found there is no toxicity to the skin.

Most reported iodophors have non-ionic surfactant contents ranging from 5—25% by weight. If iodine-surfactant interaction occurs in any of these products the rate of reaction will de dependent on the concentration of the surfactant and consequently for shaft stability the manufacturer will endeavour to keep the surfactant concentration as low as possible consistent with solubilisation of the iodine. Such products may be sanitising but their detergency will be low. In this particular specification since the problem of shelf stability has been overcome it is possible to produce sanitising detergents with total surfactant contents as high as 20—25% by weight.

An organic solvent such as an alcohol may be present to control viscosity and endow the product with antifreeze characteristics in countries where low temperatures prevail.

Unmodified anhydrous lanolin may be included in the formulation to further improve the dermatological properties of the formulation. Thus a combination of ethoxylated lanolin and anhydrous unmodified lanolin may be used.

The invention is illustrated in the following examples of iodophor under sanitising agents.

EXAMPLE 1

Ethoxylated Lanolin	15 lbs.
Iodine	2 lbs.
Citric Acid	3 lbs.
Isopropanol	10 pints
Water to give a total of	10 gallons

EXAMPLE 2

Ethoxylated octyl phenol	10 lbs.
Iodine	2 lbs.
Citric Acid	3 lbs.
Ethoxylated Lanolin	5 lbs.
Isopropanol	10 pints
Water to give a total of	10 gallons

Ethoxylated nonyl phenol may be used in the formulation of example 2 with similar results.

EXAMPLE 3

A formulation containing 20% by weight of anhydrous lanolin and 80% by weight of ethoxylated lanolin was used in this Example and in Example 4. It is designated below "Formulation 80/20".

Formulation 80/20	15 lbs.
Iodine	2 lbs.
Citric Acid	3 lbs.
Isopropanol	10 pints
Water to give a total of	10 gallons

EXAMPLE 4

Ethoxylated Lanolin	10 lbs.
Formulation 80/20	5 lbs.
Iodine	2 lbs.
Citric Acid	3 lbs.
Isopropanol	10 pints
Water to give a total of	10 gallons

In example 4 the formulation 80/20 may be replaced by a formulation containing 25% anhydrous lanolin and 75% of an alkoxylated fatty alcohol.

The effectiveness of the formulation of the invention will be illustrated by the following table, in which the effect of the iodophor of the invention (Example 2) is compared with that of a standard known iodophor alongside a control test in which no iodophor is applied to the udder.

	Iodophor of the Invention		Standard Iodophor		Control	
1. Total number of animals treated	212		197		153	
	No.	%	No.	%	No.	%
2. Animals showing teat-cracks at beginning of trial	126	59	106	54	37	24
3. Animals showing no teat-cracks at beginning of trial	86	41	91	46	116	76
4. Animals showing teat-cracks at end of trial	99	47	132	67	31	20
5. Animals showing no teat-cracks at end of trial	113	53	65	33	122	80

NOTES:

1. Out of 99 animals in the "invention" group with teat cracks at the end of the trial, 38 of these animals had only very slight teat cracking and the cracking disappeared after 10 days dipping at the end of the trial.

2. Out of 126 animals in the "invention" group which had teat cracks at the beginning of the trial, 69% of these animals had been previously subjected to udder dipping in a standard iodophor for a period of at least 10 weeks.

3. In the standard iodophor group 28% of the animals without cracks at the beginning of the trial developed cracks during the trial i.e. 26 out of 91.

4. Out of 106 animals in the standard iodophor group with teat-ctacks at the beginning of the trial, 14% of these animals had been previously subjected to udder dipping in a standard iodophor for at least 7 weeks.

5. In these tests the bactericidal activity of the iodophor of the invention was as good as that of the standard iodophor.

WHAT WE CLAIM IS:—

1. An iodophor udder sanitising agent in which the iodophor consists, at least in part, of a complex of iodine with a water soluble alkoxylated lanolin.

2. An iodophor udder sanitising agent according to claim 1 wherein the alkoxylated lanolin is ethoxylated lanolin.

3. An iodophor udder sanitising agent according to either of the preceding claims wherein the iodophor also comprises a complex of iodine with a non-ionic surfactant other than the alkoxylated lanolin.

4. An iodophor udder sanitising agent according to claim 3 wherein the non-ionic surfactant has a terminal hydroxyl group in its chain.

5. An iodophor udder sanitising agent according to claim 4 wherein the non-ionic surfactant is ethoxylated nonyl phenol or ethoxylated octyl phenol.

6. An iodophor udder sanitising agent according to any of claims 3 to 5 wherein the alkoxylated lanolin makes up at least 15% by weight of the total surfactant.

7. An iodophor udder sanitising agent according to any of the preceding claims wherein the sanitising agent has a total surfactant content of 20—25% by weight.

8. An iodophor udder sanitising agent according to any of the preceding claims wherein tht sanitising agent has a total iodine content of 1.5 to 2.5% by weight.

9. An iodophor udder sanitising agent according to any of the preceding claims which further contains unmodified anhydrous lanolin.

10. An iodophor udder sanitising agent according to any of the preceding claims which also contains a small percentage of an organic acid.

11. An iodophor udder sanitising agent substantially as described herein with reference to any of the Examples.

12. A method f preparing an iodophor udder sanitising agent according to any of claims 1 to 11 which comprises forming a complex of iodine with a water soluble alkoxylated lanolin.

13. A method according to claim 12 wherein the alkoxylated lanolin is mixed with another non-ionic surfactant before iodine is added.

14. An iodophor udder sanitising agent prepared according to the method of either of claims 12 and 13.

15. A method of disinfecting cows' udders which comprises treating the udders with an iodophor udder sanitising agent according to any of claims 1 to 11 and 14.

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Chartered Patent Agents,
Agents for the Applicants.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1969.
Published by the Patent Office, 25 Southampton Buildings, London, W.C.2, from which copies may be obtained.

PATENT SPECIFICATION

1,144,637

NO DRAWINGS

1,144,637

Inventor: SEAN GEOFFREY HALL

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ERRATA

SPECIFICATION No. 1,144,637

Page 1, line 35, *for* "mull" *read* "full"
Page 1, line 61, *for* "objvect" *read* "object"
Page 2, line 16, *for* "maelic" *read* "maleic"
Page 2, line 65, *for* "elading" *read* "leading"
Page 2, line 84, *for* "de" *read* "be"
Page 2, line 85, *for* "shaft" *read* "shelf"

THE PATENT OFFICE
10th April 1969

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